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ABSTRACT

The experiments outlined in this paper assess the relative effectiveness of two approaches to teaching foreign language grammar to adults. One approach, called the "Implicit Method," is based on the audiolingual habit theory of language learning. Grammar is taught inductively through the reading of dialogues and practice with carefully structured pattern drills. The other approach, called the "Explicit Method," is based on the cognitive code-learning theory of language acquisition. Students are given explicit explanations of the grammatical problem before they are given the opportunity to practice the language. The general conclusion drawn from the experiments is that adult students acquire foreign language grammar better by using a cognitive method than by using a method based exclusively on habit-forming principles. Procedures and experimental results are described in this report. (Author/RL)

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THE ACQUISITION OF FOREIGN LANGUAGE GRAMMAR BY ADULTS

A Summary Report on Three Field Experiments

BY

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1. Introduction

The nature of the language acquisition process has been the subject of much discussion in recent decades. In particular it is certain aspects of foreign-language teaching and learning that have attracted attention. Since the 1950s the predominant methods of teaching have placed great emphasis on such elements as repetition and imitation, notably through pattern drills, whereas the role of the cognitive element (analysis and understanding of the structure of the language) has been played down. Underlying the pattern drill technique is the behaviourist theory of language acquisition as expounded in, for instance, B.F. Skinner's Verbal Behavior (1957). According to Skinner linguistic behaviour can be explained in terms of stimulus and response, much like any other kind of human behaviour (including motor activities). A language is acquired through reinforcement of the correct verbal responses, and therefore language training should consist mainly of imitation and repetitive practice with suitable language patterns until automatized verbal habits have been developed. In the last fifteen years these theories have been challenged as being inadequate descriptions of linguistic behaviour, especially by linguists influenced by generative transformational grammar, but also by others who have been disappointed at the results attained in the modern language classes. According to the critics linguistic behaviour is something quite different from simple associative reactions to internal and external stimuli. Man is endowed with a specific human capacity for language learning, a so-called "language acquisition device" for want of a better term, which enables him to develop speech according to a lawful scheme, quite independently of such notions as environmental stimuli, reinforcement, and habit-formation. Every speaker of a language has, on the basis of available "input data", built up a grammar, an inventory of rules, which makes it possible for him to ...pret and construct utterances that he has never encountered ...ore. This faculty, the critics say, cannot be explained by the behaviourist theory of language. As Chomsky (1966, p. 60) has pointed

out, an adequate and complete theory of language learning must be able to account for "the quite obvious fact that the speaker of a language knows a great deal that he has not learned."

This paper outlines the procedures and results of three field experiments undertaken with a view to finding empirical evidence on some of the issues in the current controversy. Specifically it is the role of imitation and repetition (pattern drills) and the role of conscious awareness of the structure of the foreign language that have been investigated. A great many psycholinguistic experiments of a similar kind have previously been conducted, but no very clear-cut results have as yet been obtained; overall there seems to be a certain trend in favour of "cognitive" methods (Oskarsson, 1972). It should be noted, however, that many studies have been poorly controlled. It is notoriously difficult to carry out educational experiments in such a way that the results can be related to one specific cause, i.e. the experimental variable; all too often a multiplicity of variables enter into the experiment so that the results lose their significance. Particularly difficult to control is the variable of teacher performance in the classroom. In the experiments which I am going to describe we have tried to come to grips with this problem by using prerecorded lessons in which the same native English teachers appeared in both lesson series. There are certain disadvantages with this arrangement, but the advantages over experiments with live teachers are obvious.

The research has been conducted at the Gothenburg School of Education and the University of Gothenburg by members of the GUME Adults research group (Tibor von Elek and Mats Oskarsson). As indicated above the primary aim of the first experiments was to test two conflicting theories of language acquisition and to contribute to better methods of teaching foreign languages to adults. Grammar was selected as our specific field of inquiry as it is the most important and most difficult aspect of language acquisition. The reason for choosing adults as subjects was, finally, that the tremendous expansion of adult education in the past few years has brought into focus the special problems of learning after adolescence.[1] It is commonly agreed that adults do not acquire a second language in the same way and with the same results as children, but only little is known about what exactly is the most effective teaching strategy.

[1] In this paper the term adult education refers to education for adults whose previous schooling is only basic, compulsory education.

2. The Experiments

2.1 Schedule. The schedule for the entire GUME Adults programme is as follows:

Spring term 1970	Construction of experimental materials; pilot study
Autumn term 1970	The first field study
Spring term 1971	Evaluation; planning of replication study
Autumn term 1971	Replication study
Spring term 1972	Evaluation and reports
Autumn 1972 - Spring 1974	Further experiments and reports

The present report concerns the 1970 and 1971 experiments. A separate, detailed report on the 1970 experiment is available (von Elek and Oskarsson, 1972a). A shorter report on the same experiment has been published in IRAL (von Elek and Oskarsson, 1972b).

2.2 Objectives. The main objective of the experiments in 1970 and 1971 was to investigate which one of two language learning theories, the audiolingual habit theory and the cognitive code-learning theory (Carroll, 1965, p. 278), provides the better basis for teaching foreign-language grammar to adults. The experiments were devised so as to permit analyses of treatment effects at different age, proficiency, and aptitude levels, in addition to the analysis over the entire experimental samples. Other objectives included the investigation of treatment effects with each of the five grammatical structures taught, and the measurement of attitudes generated by the two treatments.

2.3 The Pilot Study. The field studies were preceded by some exploratory experimentation in the spring term of 1970. Two evening classes of adult students, comparable to the final experimental samples, participated in a pilot study in which first-version teaching materials and tests were tried out. The average proficiency in English and the approximate proficiency range were assessed, the technical equipment was checked, and student attitudes towards various aspects of the experimental lessons were measured.

Several useful observations on practical details were made, especially as regards timing and pauses. The importance of first-rate teaching materials and high sound quality was apparent. The achievement tests were analysed and a number of items that were either too easy, too difficult or otherwise unsuitable were replaced. The bulk of the original test items discriminated well and could be retained.

2.4 The Instructional Methods and Experimental Procedures. According to Carroll (1965, p. 278) two major theories on the acquisition of a foreign language can be identified. The one, termed the audiolingual habit theory, has the following characteristics and basic tenets:

Speech is primary and writing secondary, and therefore the habits "must be learned first of all as auditory discrimination responses and speech responses."

The verbal habits must be automatized so that they can be called forth without conscious attention.

" . . . the automatization of habits occurs chiefly by practice, that is, by repetition."

Reference should not be made to the learner's native language, since this "would confuse the student, who needs only to imitate the foreign language sounds and patterns until by practice he masters them."

The other theory, called the cognitive code-learning theory, "attaches more importance to the learner's understanding of the structure of the foreign language than to his facility in using that structure, since it is believed that, provided the student has a proper degree of cognitive control over the structures of the language, facility will develop automatically with the use of the language in meaningful situations" (Ibid.). Further it is believed that "learning a language is a process of acquiring conscious control of the phonological, grammatical, and lexical patterns of a second language, largely through study and analysis of these patterns . . ." Finally "differences between the native language and the target language should be carefully explained."

The experimental methods were designed to correspond closely to these two theories. The method based on the audiolingual habit theory was termed the Implicit Method, or IM, i.e. grammar was to be acquired mainly through implicit inferences drawn from practice with the language. The exercises consisted chiefly of carefully structured and graded pattern drills, performed on the basis of situational pictures projected on a screen in front of the class. Care was taken to avoid mechanical and extended drills as they tend to cause fatigue and boredom. The audiolingual skills were given priority. The written exercises were mostly of the drill type, too. There were no explicit explanations, comparisons with the source language, or translation exercises; only the target language was used, except in a few directions in the beginning of the lesson series. As no time was taken to explain grammar, a great part of each lesson could be devoted to functional practice.

The experimental method based on the cognitive theory was called the Explicit Method, or EX. The students were given explicit information--in the mother tongue--about the syntactic characteristics of the structures being practised, since, according to the theory, understanding of grammar is an important aspect of second language learning. Comparisons were made with the corresponding structures in Swedish in order to clarify and explain the differences between the two languages. The grammar was taught deductively, that is, the explanations and directions were given before main practice with the structure under study. Upon every instance of clarification the students were given immediate practice of the structure, usually with stimuli in the source language. This gave them the opportunity to apply their insight on a functional level. The exercises, both oral and written, were mostly of the fill-in type or translations. No pattern drills were performed.

Although the IM and EX programmes differed profoundly in their mode of presenting the subject matter, they were essentially the same in all other respects. The same five grammatical structures were taught (some and any and their compounds, adjectives and adverbs, preposition + gerund, possessive pronouns, and the passive voice); the vocabulary and basic texts, as well as pictures for illustration, music, technical equipment, format of workbooks, etc. were identical. The same native teachers recorded the lessons-the Swedish explanations in EX were recorded by one of the experimenters--and the duration

of the lessons was the same. Therefore the contents and materials could be regarded as equal; the two series of lessons differed only with respect to method of teaching.

The experimental programmes each consisted of ten 40-minute lessons recorded in advance in a studio and played back in class from a tape recorder. The subjects were supplied with workbooks, one for each lesson, containing the basic text and the written exercises. A set of transparencies for use with an overhead projector accompanied each lesson. The purpose was to make the lessons as vivid and interesting as possible as there was no live teacher to focus the students' attention. Class teachers administered the tests, operated the tape recorder and the projector, handed out and collected workbooks, but did not otherwise take part in the teaching. They did not answer any questions and did not in any other way comment on the contents of the lessons. Neutral observers who listened in to some of the lessons have testified that both programmes functioned equally well, and that the subjects of both treatment groups participated actively in the lessons.

2.5 Evaluation Instruments. The lessons were administered at ten consecutive class-meetings in each experiment. Immediately after the last lesson a questionnaire was given to measure student motivation (Attitude Test). An achievement test battery serving both as a pre- and a post-test was given at class-meetings preceding and following the lesson series. A general proficiency test and a verbal aptitude test were also given. In the 1970 experiment a test on the regular course, that is the course studied before and after the experimental lessons, was administered (Term Test), as well as an oral test and another general proficiency test called PACT (Pictorial Auditory Comprehension Test). This test involved choosing between pictures on the basis of cues from a tape.

The achievement test, by which progress during the experiment was measured, consisted of three parts (A, B, and C) with a total of 130 items, divided equally between the five grammatical structures. Every fifth item tested the same structure. Part A was a 60-item multiple choice test with oral stimuli, Part B was a written multiple choice test with 50 items, and Part C was a 20-item written production test in which the subjects were to fill in the crucial words in incomplete English sentences.

The oral test included both recognition and production items. It was administered in a modern language laboratory. Each subject's performance was recorded on tape and marked separately.

2.6 The Experimental Samples. The subjects of the first experiment (1970) consisted of six classes of adult students taking a continuation course in English. All subjects had an elementary knowledge of the language, but they did not master the structures selected for the investigation. The average age was 33 years, the large majority being between 20 and 40 years. There were 82 females and 43 males. About half of the subjects were gainfully employed, and about half of the females were housewives.

The classes were randomly assigned to the two treatments, with three classes in each group. The IM classes were given the identification numbers 01, 02, and 03, and the EX classes the numbers 11, 12, and 13. Table 1 gives the background characteristics of the two samples:

Table 1

Background Characteristics of the Experimental Samples in the 1970 Experiment

Variable	Max	Treatment								
		IM(01+02+03)			EX(11+12+13)			Total		
		N	$\bar{x}$	s	N	$\bar{x}$	s	N	$\bar{x}$	s
Proficiency Test	60	57	31.00	10.13	68	30.54	8.94	125	30.75	9.46
PACT	55	57	32.84	11.35	67	29.54	10.24	124	31.06	10.85
Pre-test	130	57	56.56	18.32	68	53.18	13.57	125	54.72	15.94
Verb. Apt. Test	70	48	51.27	10.19	63	51.49	8.49	111	51.40	9.22
Age	-	57	30.68	8.08	68	34.90	9.53	125	32.98	9.11

The only significant difference between the treatment groups was in age ($p. < .01$).

In the replication experiments at two folk high schools in 1971 only full-time students participated. The experimental treatments and the tests were exactly the same as in the 1970 study, except for PACT and the oral test, which were omitted. A better verbal aptitude test was substituted for the original one.

The subjects were matched on the pre-test results and assigned randomly to the two treatments so that two experimental classes, an IM and an EX class, were formed at each school. The IM classes were assigned the identification numbers 04 and 05, the EX classes the numbers 14 and 15. The average age of the entire experimental sample was 22 years. The majority were between 18 and 24 (77 subjects); only two students were older than 34.

The standings of the two treatment groups (classes 04 and 05 vs. classes 14 and 15) on four background variables are reported in Table 2:

Table 2

Background Characteristics of the Experimental Samples in the Replication Study (1971)

Variable	Max	Treatment								
		IM (04+05)			EX (14+15)			Total		
		N	$\bar{x}$	s	N	$\bar{x}$	s	N	$\bar{x}$	s
Proficiency Test	60	42	34.10	8.74	43	31.21	9.03	85	32.64	8.95
Pre-test	130	45	62.89	17.47	46	60.02	17.59	91	61.44	17.49
Verb. Apt. Test	56	45	25.24	7.00	46	24.67	6.98	91	24.96	6.96
Age	-	45	22.82	6.78	46	21.33	3.46	91	22.07	5.39

2.7 Results. In the computation of treatment effects only data from subjects who had attended at least eight of the ten experimental lessons were used. After the elimination of "drop-outs" the final sample in the 1970 experiment consisted of 125 subjects. In the replication study 91 subjects remained for the final analyses.

There was substantial progress as a result of the experimental lessons. Table 3 shows the unadjusted means and standard deviations in the 1970 experiment:

Table 3

Overall Achievement Scores in the 1970 Experiment: Unadjusted Means and Standard Deviations

Treatment Group	Pre-test			Post-test			Progress		
	N	$\bar{x}$	s	N	$\bar{x}$	s	N	$\bar{x}$	s
IM	57	56.56	18.32	57	69.93	20.03	57	13.37	10.12
EX	68	53.18	13.57	68	77.60	20.53	68	24.43	13.67
Total	125	54.72	15.94	125	74.10	20.58	125	19.38	13.33

The EX progress scores are significantly larger than the IM scores ($p. < .01$). In order to allow for differences between the treatment groups with respect to initial proficiency and aptitude three analyses of covariance were performed. The results are set out in Table 4:

Table 4

Analyses of Covariance. Dependent Variable: Progress

Covariate	Adjusted Means		F ratio	p	ss'_y			df	b_w
	IM	EX			Between		Within		
Proficiency Test	13.30	24.48	27.19	.01	3877	17	397	1/122	.28
PACT	13.09	24.74	27.63	.01	4083	17	883	1/121	.16
Verbal Aptitude Test	11.78	25.00	33.16	.01	4762	15	507	1/108	.20

The difference between the groups is accentuated when results on the proficiency and aptitude tests are taken into account.

The results of the 1971 replication experiments are similar to those of the original experiment as Table 5 shows:

Table 5

Overall Achievement Scores in the Replication Experiments: Unadjusted Means and Standard Deviations

Treatment Group	Pre-test			Post-test			Progress		
	N	$\bar{x}$	s	N	$\bar{x}$	s	N	$\bar{x}$	s
IM	45	62.89	17.47	45	77.47	16.93	45	14.58	8.58
EX	46	60.02	17.59	46	82.50	19.19	46	22.48	11.28
Total	91	61.44	17.49	91	80.01	18.18	91	18.57	10.74
	$t = .78$			$t = 1.32$			$t = 3.75$		

The EX students again make better progress than the IM students but the difference is somewhat smaller than in the 1970 experiment. The difference in progress is significant at the .01 level.

Table 6 gives a survey of the results attained by all the individual classes involved in the experiments:

Table 6

Overall Achievement Scores in all ten Experimental Classes (1970-71)

Class	N	Pre-test		Post-test		Progress	
		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
01	14	62.21	18.40	74.21	16.00	12.00	11.56
02	24	54.04	18.55	69.42	21.30	15.38	10.66
03	19	55.58	18.04	67.42	21.50	11.84	8.22
04	29	59.24	16.12	73.97	16.29	14.72	8.04
05	16	69.50	18.39	83.81	16.68	14.31	9.74
IM Total	102	59.35	18.14	73.26	19.03	13.91	9.46
11	30	54.43	15.24	79.43	24.97	25.00	16.30
12	22	51.55	12.69	74.95	15.93	23.41	11.69
13	16	53.06	11.85	77.81	17.44	24.75	11.28
14	28	57.04	15.13	81.00	17.92	23.96	11.04
15	18	64.67	20.45	84.83	21.33	20.17	11.58
EX Total	114	55.94	15.67	79.58	20.08	23.64	12.79

The pattern of results is very regular. The EX classes are uniformly superior, both with respect to total scores and to scores on the three subtests (A, B, and C).

The Oral Test in the 1970 experiment yielded results in the same direction as the other achievement tests, although the differences were less pronounced (Table 7):

Table 7

Oral Test Results: Unadjusted Means and Standard Deviations

Treatment group	Recognition			Production			Total		
	N	$\bar{x}$	s	N	$\bar{x}$	s	N	$\bar{x}$	s
IM	39	22.33	5.83	39	10.33	5.75	39	32.67	10.97
EX	56	23.46	4.47	56	12.68	5.75	56	36.14	9.06

The EX students did better than the IM students not only in the recognition part but also in the more active production part. An analysis of covariance with a weighted sum of PACT, Proficiency Test, and Pre-test scores as a multiple covariate showed that the difference between the adjusted total means is significant at the .01 level.

The items were arranged in a regular order in each test, which made it easy to compute progress on each structure in addition to total progress. Apart from the main effect no consistent pattern could be discerned (Table 8):

Table 8

Progress on each Structure: Treatment Means

	Structure				
	1 some/any	2 ajd/adv	3 prep+ing	4 poss.pron.	5 pass.
IM 1970	2.07	2.44	1.81	2.93	4.12
1971	2.71	1.73	4.00	3.00	3.13
EX 1970	2.69	3.74	4.13	6.72	7.15
1971	2.57	2.78	6.24	5.43	5.46

The Term Test, given at the end of the regular term in the 1970 experiment, was intended to measure learning outside the experiment, i.e. in the regular course, where the groups were receiving identical teaching as far as possible. The results are presented in Table 9:

Table 9

Term Test Results: Unadjusted Means and Standard Deviations

	N	$\bar{x}$	s
IM	53	54.85	11.31
EX	66	53.90	11.46

$t = .45$

The IM subjects are slightly better on this extra-experimental measure, but the difference is not significant. This reflects the relationship between the two groups prior to the experimental lesson series.

In order to investigate whether there was any systematic covariation (interaction) between treatment and age, proficiency, or aptitude, the experimental groups were each divided into three age levels, three proficiency levels, and three aptitude levels. The learning effects at the various levels were then investigated by the method of analysis of variance (two-way classification). For lack of space the data and computations will have to be left out here. The following is a brief account of the main findings.

There were no interaction effects such that the relative effectiveness of the two methods varied with learner characteristics. The differences between method means were generally larger than the differences between level means within each treatment.

On the whole there were no very great differences between the lower, middle, and upper age levels as regards progress. In the 1970 experiment the subjects over the age of 40 learned almost as much as the subjects under the age of 26 (mean progress scores 16.75 and 19.38 respectively). In the replication experiments the subjects who were 20 years and younger achieved a mean progress score of 20.56 as against 16.79 for the subjects who were 21 and older. The mean progress scores for the three aptitude levels in the latter experiments were 16.79 (lower), 17.79 (middle), and 20.71 (upper).

The results of the Attitude Test indicated that both types of lessons were favourably received, but that the attitudes were more positive towards the EX series. Application of a non-parametric test (the Mann-Whitney U Test) showed that the difference in favour of the EX method was statistically significant. The differences in opinion towards instructional materials and other details of the lessons were small and negligible.

3. Summary and Conclusions

The experiments outlined in this paper aimed at assessing the relative effectiveness of two approaches to teaching foreign-language grammar to adults. The one approach, called the Implicit (IM) method, was based on the audiolingual habit theory of language learning. The grammar was taught inductively through text reading (dialogues) and carefully structured pattern drills (oral and written) in accordance with the hypothesis that a language is acquired by a process of analogical habit-formation. Much functional practice with the language was provided, but no explanations or generalizations were given.

The other approach, called the Explicit (EX) method, was based on the cognitive code-learning theory of language acquisition. The students were given explicit explanations of the grammatical problems before they were given the opportunity to practise the language. Practice consisted chiefly of oral and written fill-in or translation exercises. Contrastive comparisons were regularly made between the structures of the source and the target languages. No pattern drills were performed.,

Ten experimental lessons implementing each method were administered to a total of ten classes of adult learners. Five grammatical problems were taught. The learning was measured with an achievement test battery administered before and after the lesson series. All experimental lessons were recorded in advance on tape.

The results consistently favoured the Explicit method. The differences were significant at the .01 level of confidence. The Explicit method also generated a more positive attitude than the Implicit method. There was no interaction between method of teaching and student variables: the EX students were uniformly superior at all age, proficiency, and aptitude levels.

A word of warning against too far-reaching interpretations of the results may be in order. Since our field of inquiry was restricted to the acquisition of grammar by adults, the findings cannot be automatically carried over to other areas of language learning.

The general conclusion that can be drawn from the present study is that adult students acquire foreign-language grammar better by a cognitive method than by a method built exclusively on habit-forming principles. It also seems safe to say that explanations clarifying the structure of the foreign language are worthwhile even when supplied at the expense of practice. Finally it can be concluded that the cognitive approach results in better motivation and more favourable attitudes than the habit-forming approach.

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